



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
National Air and Radiation Environmental Laboratory
540 South Morris Avenue, Montgomery, AL 36115-2601
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EPA Region 5 Records Ctr.



232873

July 23, 2004

MEMORANDUM

SUBJECT: Radiochemical Results for
Lindsay Light II-Lake Shore East Samples

FROM: John Griggs, Chief *John Griggs*
Monitoring and Analytical Services Branch

TO: Fred Micke, On-Scene Coordinator
Region 5

Attached are data packages for gross alpha and beta analysis of samples collected from the Lindsay Light Site, Lake Shore East in Chicago, IL. The sample constitutes NAREL batch numbers 0400031 and 0400032.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Jack Barnette, Region 5, w/o attachments
Steve Ostrodka, SF, Region 5, w/o attachments
Mary Clark, (6601J), w/o attachments
Ed Sensintaffar, NAREL

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400032

Project: LINDSAY LIGHT II
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 07/20/2004

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.02897P	11C#1	SAM	SOIL	04/04/2003	06/10/2004
A4.02898Q	11C#2	SAM	SOIL	04/04/2003	06/10/2004
A4.02899R	11D	SAM	SOIL	04/04/2003	06/10/2004
A4.02900Q	9D/9C NE	SAM	SOIL	04/11/2003	06/10/2004
A4.02901R	9D/9C SE	SAM	SOIL	04/11/2003	06/10/2004
A4.02902T	9D/9C NW	SAM	SOIL	04/11/2003	06/10/2004
A4.02903U	9D/9C SW	SAM	SOIL	04/11/2003	06/10/2004
A4.02904V	10D#2	SAM	SOIL	04/11/2003	06/10/2004
A4.02905W	C-218 (73)	SAM	SOIL	06/20/2003	06/10/2004
A4.02906X	C-201(31)#1	SAM	SOIL	07/08/2003	06/10/2004
A4.02907Y	C-201(31)#2	SAM	SOIL	07/08/2003	06/10/2004
A4.02908Z	12C#1	SAM	SOIL	08/27/2003	06/10/2004
A4.02909A	12C#2	SAM	SOIL	08/27/2003	06/10/2004
A4.02910T	12C#3	SAM	SOIL	08/27/2003	06/10/2004
A4.02911U	C-2-3 CAISSON	SAM	SOIL	11/11/2003	06/10/2004
A4.02912V	13D EAST	SAM	SOIL	11/11/2003	06/10/2004
A4.02913W	13D WEST	SAM	SOIL	11/11/2003	06/10/2004

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

M. F. Wisdom 07/22/04
for Mary F. Wisdom Date
Quality Assurance Coordinator

John Griggs 7/22/04
John Griggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

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ALPBET ANALYSES
SDG #0400032**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.02897P	DUP	N/A	07/15/2004	0008792E	0003315W
A4.02898Q		N/A	07/15/2004	0008792E	0003315W
A4.02899R		N/A	07/15/2004	0008792E	0003315W
A4.02900Q		N/A	07/15/2004	0008792E	0003315W
A4.02900Q		N/A	07/15/2004	0008792E	0003315W
A4.02901R		N/A	07/15/2004	0008792E	0003315W
A4.02902T		N/A	07/15/2004	0008792E	0003315W
A4.02903U		N/A	07/15/2004	0008792E	0003315W
A4.02904V		N/A	07/15/2004	0008792E	0003315W
A4.02905W		N/A	07/15/2004	0008792E	0003315W
A4.02906X		N/A	07/15/2004	0008792E	0003315W
A4.02907Y		N/A	07/15/2004	0008792E	0003315W
A4.02908Z		N/A	07/15/2004	0008792E	0003315W
A4.02909A		N/A	07/15/2004	0008792E	0003315W
A4.02910T		N/A	07/15/2004	0008792E	0003315W
A4.02911U		N/A	07/15/2004	0008792E	0003315W
A4.02912V		N/A	07/16/2004	0008792E	0003315W
A4.02913W		N/A	07/16/2004	0008792E	0003315W

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02897P	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.014e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.92 %	Analyst:	EFG
Ash/dry weight:	90.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 16:52	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	9.74e+00	1.2e+01	9.0e+00	PCI/GDRY	07/15/2004
Beta	1.76e+01	4.1e+00	4.5e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02898Q	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.011e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	87.03 %	Analyst:	EFG
Ash/dry weight:	84.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 16:52	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.67e+01	1.3e+01	8.2e+00	PCI/GDRY	07/15/2004
Beta	2.66e+01	4.4e+00	4.5e+00	PCI/GDRY	07/15/2004.

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02899R	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.016e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.22 %	Analyst:	EFG
Ash/dry weight:	89.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 16:52	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.63e+01	1.3e+01	1.1e+01	PCI/GDRY	07/15/2004
Beta	1.60e+01	4.1e+00	4.7e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02900Q	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.012e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	91.54 %	Analyst:	EFG
Ash/dry weight:	89.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 16:52	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.13e+01	1.2e+01	9.3e+00	PCI/GDRY	07/15/2004
Beta	1.93e+01	4.1e+00	4.5e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02900Q	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.015e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	91.54 %	Analyst:	EFG
Ash/dry weight:	89.20 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 18:33	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.22e+01	1.4e+01	8.9e+00	PCI/GDRY	07/15/2004
Beta	1.65e+01	4.0e+00	4.6e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02901R	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.010e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	90.47 %	Analyst:	EFG
Ash/dry weight:	86.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 18:33	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.29e+01	1.4e+01	8.4e+00	PCI/GDRY	07/15/2004
Beta	1.73e+01	4.1e+00	4.7e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02902T	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.008e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	93.55 %	Analyst:	EFG
Ash/dry weight:	84.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 18:33	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.37e+01	1.2e+01	1.0e+01	PCI/GDRY	07/15/2004
Beta	1.90e+01	4.1e+00	4.5e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02903U	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.010e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	88.83 %	Analyst:	EFG
Ash/dry weight:	86.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 18:33	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.99e+01	1.3e+01	9.0e+00	PCI/GDRY	07/15/2004
Beta	2.83e+01	4.6e+00	4.4e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02904V	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.012e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.81 %	Analyst:	EFG
Ash/dry weight:	92.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 20:13	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	8.97e+00	1.2e+01	9.2e+00	PCI/GDRY	07/15/2004
Beta	2.01e+01	4.3e+00	4.6e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02905W	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.014e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.07 %	Analyst:	EFG
Ash/dry weight:	90.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 20:13	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	8.14e+00	1.1e+01	8.7e+00	PCI/GDRY	07/15/2004
Beta	1.40e+01	3.9e+00	4.6e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02906X	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.014e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	89.37 %	Analyst:	EFG
Ash/dry weight:	87.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 20:13	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.35e+01	1.4e+01	1.0e+01	PCI/GDRY	07/15/2004
Beta	1.68e+01	4.1e+00	4.7e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02907Y	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.013e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	89.72 %	Analyst:	EFG
Ash/dry weight:	88.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 20:13	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.03e+01	1.3e+01	9.2e+00	PCI/GDRY	07/15/2004
Beta	1.96e+01	4.2e+00	4.5e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02908Z	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.019e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	82.13 %	Analyst:	EFG
Ash/dry weight:	85.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 21:53	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.31e+01	1.4e+01	8.5e+00	PCI/GDRY	07/15/2004
Beta	1.93e+01	4.1e+00	4.4e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02909A	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.023e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	84.52 %	Analyst:	EFG
Ash/dry weight:	87.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 21:53	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.78e+01	1.3e+01	8.5e+00	PCI/GDRY	07/15/2004
Beta	2.98e+01	4.7e+00	4.5e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02910T	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.010e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	92.44 %	Analyst:	EFG
Ash/dry weight:	82.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 21:53	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	8.81e+00	1.1e+01	9.7e+00	PCI/GDRY	07/15/2004
Beta	2.19e+01	4.1e+00	4.3e+00	PCI/GDRY	07/15/2004

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SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02911U	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.021e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	88.62 %	Analyst:	EFG
Ash/dry weight:	90.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 21:53	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.14e+01	1.2e+01	9.4e+00	PCI/GDRY	07/15/2004
Beta	1.76e+01	4.1e+00	4.5e+00	PCI/GDRY	07/15/2004

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SAMPLE ANALYSIS REPORT

Sample #:	A4.02912V	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.019e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	87.86 %	Analyst:	EFG
Ash/dry weight:	89.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 23:33	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.06e+01	1.2e+01	8.9e+00	PCI/GDRY	07/15/2004
Beta	2.20e+01	4.3e+00	4.4e+00	PCI/GDRY	07/15/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400032**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02913W	QC batch #:	0003315W
Matrix:	SOIL	Prep batch #:	0008792E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.014e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	84.33 %	Analyst:	EFG
Ash/dry weight:	89.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2004 23:33	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.28e+01	1.5e+01	8.7e+00	PCI/GDRY	07/15/2004
Beta	2.14e+01	4.4e+00	4.8e+00	PCI/GDRY	07/15/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400032**

QC BATCH SUMMARY

QC batch #: 0003315W
Preparation procedure: N/A
Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	$\pm 2\sigma$ Uncertainty (%)	Analyst
A4.02897P	DUP	N/A		EFG
A4.02898Q		N/A		EFG
A4.02899R		N/A		EFG
A4.02900Q		N/A		EFG
A4.02900Q		N/A		EFG
A4.02901R		N/A		EFG
A4.02902T		N/A		EFG
A4.02903U		N/A		EFG
A4.02904V		N/A		EFG
A4.02905W		N/A		EFG
A4.02906X		N/A		EFG
A4.02907Y		N/A		EFG
A4.02908Z		N/A		EFG
A4.02909A		N/A		EFG
A4.02910T		N/A		EFG
A4.02911U		N/A		EFG
A4.02912V		N/A		EFG
A4.02913W		N/A		EFG

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0003315W

Analytical Procedure: NAREL GR-03

LABORATORY DUPLICATES (PCI/GASH)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A4.02900Q	ALPHA	1.27e+01 \pm 1.3e+01	2.49e+01 \pm 1.6e+01	64.78	1.17 OK
A4.02900Q	BETA	2.16e+01 \pm 4.6e+00	1.85e+01 \pm 4.5e+00	15.45	-0.88 OK

Analyst:

Emice F. Gatlin
Gatlin, Emice F.

7/20/04

QA Officer:

Mark J. McLean

7/20/04

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400031

Project: LINDSAY LIGHT II
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 07/20/2004

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.02877K	28A	SAM	SOIL	12/23/2002	06/10/2004
A4.02878L	26CD	SAM	SOIL	12/23/2002	06/10/2004
A4.02879M	35B36A	SAM	SOIL	12/23/2002	06/10/2004
A4.02880E	E-F.5/13-19	SAM	SOIL	01/27/2003	06/10/2004
A4.02881F	I-N/13-19	SAM	SOIL	01/27/2003	06/10/2004
A4.02882G	S-9 WEST	SAM	SOIL	01/27/2003	06/10/2004
A4.02883H	S-9 EAST	SAM	SOIL	01/27/2003	06/10/2004
A4.02884J	10A	SAM	SOIL	02/05/2003	06/10/2004
A4.02885K	29C	SAM	SOIL	02/05/2003	06/10/2004
A4.02886L	11A10B WEST	SAM	SOIL	02/05/2003	06/10/2004
A4.02887M	11A10B EAST	SAM	SOIL	02/11/2003	06/10/2004
A4.02888N	7C	SAM	SOIL	03/06/2003	06/10/2004
A4.02889P	9A#1	SAM	SOIL	03/27/2003	06/10/2004
A4.02890G	9A#2	SAM	SOIL	03/27/2003	06/10/2004
A4.02891H	9B	SAM	SOIL	03/27/2003	06/10/2004
A4.02892J	36A	SAM	SOIL	03/27/2003	06/10/2004
A4.02893K	9C	SAM	SOIL	04/04/2003	06/10/2004
A4.02894L	10C	SAM	SOIL	04/04/2003	06/10/2004
A4.02895M	10D#1	SAM	SOIL	04/04/2003	06/10/2004
A4.02896N	10D#3	SAM	SOIL	04/04/2003	06/10/2004

EXCEPTIONS

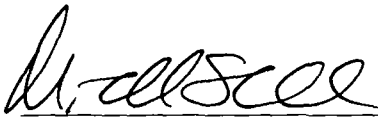
1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

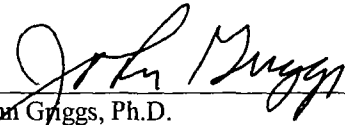
QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

 07/22/04
for Mary F. Wisdom Date
Quality Assurance Coordinator

 7/22/04
John Griggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.02877K	DUP	N/A	07/14/2004	0008789K	0003314V
A4.02878L		N/A	07/14/2004	0008789K	0003314V
A4.02879M		N/A	07/14/2004	0008789K	0003314V
A4.02880E		N/A	07/14/2004	0008789K	0003314V
A4.02880E		N/A	07/14/2004	0008789K	0003314V
A4.02881F		N/A	07/14/2004	0008789K	0003314V
A4.02882G		N/A	07/14/2004	0008789K	0003314V
A4.02883H		N/A	07/14/2004	0008789K	0003314V
A4.02884J		N/A	07/14/2004	0008789K	0003314V
A4.02885K		N/A	07/14/2004	0008789K	0003314V
A4.02886L		N/A	07/14/2004	0008789K	0003314V
A4.02887M		N/A	07/14/2004	0008789K	0003314V
A4.02888N		N/A	07/14/2004	0008789K	0003314V
A4.02889P		N/A	07/14/2004	0008789K	0003314V
A4.02890G		N/A	07/14/2004	0008789K	0003314V
A4.02891H		N/A	07/14/2004	0008789K	0003314V
A4.02892J		N/A	07/14/2004	0008789K	0003314V
A4.02893K		N/A	07/14/2004	0008789K	0003314V
A4.02894L		N/A	07/14/2004	0008789K	0003314V
A4.02895M		N/A	07/14/2004	0008789K	0003314V
A4.02896N		N/A	07/15/2004	0008789K	0003314V

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02877K	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.013e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	98.35 %	Analyst:	EFG
Ash/dry weight:	92.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 15:21	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.78e+00	1.1e+01	9.4e+00	PCI/GDRY	07/14/2004
Beta	1.03e+01	3.7e+00	4.7e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02878L	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.039e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	98.52 %	Analyst:	EFG
Ash/dry weight:	80.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 15:21	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	4.72e+00	9.8e+00	8.5e+00	PCI/GDRY	07/14/2004
Beta	1.37e+01	3.4e+00	3.9e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02879M	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.011e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	85.40 %	Analyst:	EFG
Ash/dry weight:	77.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 15:21	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	4.70e+01	1.6e+01	8.9e+00	PCI/GDRY	07/14/2004
Beta	2.98e+01	4.5e+00	4.5e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02880E	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.006e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.02 %	Analyst:	EFG
Ash/dry weight:	88.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 15:21	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.84e+01	1.3e+01	8.5e+00	PCI/GDRY	07/14/2004
Beta	2.09e+01	4.2e+00	4.5e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02880E	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.016e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.02 %	Analyst:	EFG
Ash/dry weight:	88.00 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 17:01	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.22e+01	1.2e+01	9.0e+00	PCI/GDRY	07/14/2004
Beta	2.16e+01	4.3e+00	4.6e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02881F	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.015e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	82.47 %	Analyst:	EFG
Ash/dry weight:	82.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 17:01	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.50e+01	1.2e+01	8.7e+00	PCI/GDRY	07/14/2004
Beta	2.51e+01	4.2e+00	4.2e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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ALPBET ANALYSES
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SAMPLE ANALYSIS REPORT

Sample #:	A4.02882G	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.022e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.04 %	Analyst:	EFG
Ash/dry weight:	86.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 17:01	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.99e+01	1.3e+01	1.0e+01	PCI/GDRY	07/14/2004
Beta	1.88e+01	4.1e+00	4.6e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02883H	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.013e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	87.60 %	Analyst:	EFG
Ash/dry weight:	79.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 17:01	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.89e+01	1.3e+01	7.6e+00	PCI/GDRY	07/14/2004
Beta	2.68e+01	4.3e+00	4.2e+00	PCI/GDRY	07/14/2004

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ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02884J	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.016e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	90.40 %	Analyst:	EFG
Ash/dry weight:	88.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 18:41	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.71e+01	1.3e+01	9.1e+00	PCI/GDRY	07/14/2004
Beta	1.77e+01	4.1e+00	4.7e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02885K	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.012e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	84.70 %	Analyst:	EFG
Ash/dry weight:	86.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 18:41	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.94e+01	1.3e+01	9.2e+00	PCI/GDRY	07/14/2004
Beta	2.15e+01	4.2e+00	4.5e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02886L	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.018e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	92.36 %	Analyst:	EFG
Ash/dry weight:	89.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 18:41	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.19e+01	1.3e+01	1.0e+01	PCI/GDRY	07/14/2004
Beta	1.77e+01	4.1e+00	4.7e+00	PCI/GDRY	07/14/2004

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ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02887M	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.021e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	92.86 %	Analyst:	EFG
Ash/dry weight:	88.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 18:41	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.38e+01	1.2e+01	8.5e+00	PCI/GDRY	07/14/2004
Beta	1.56e+01	3.9e+00	4.5e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02888N	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.013e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	93.24 %	Analyst:	EFG
Ash/dry weight:	90.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 20:22	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	7.60e+00	1.2e+01	9.2e+00	PCI/GDRY	07/14/2004
Beta	1.78e+01	4.1e+00	4.7e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02889P	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.014e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	88.96 %	Analyst:	EFG
Ash/dry weight:	78.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 20:22	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.40e+01	1.2e+01	8.4e+00	PCI/GDRY	07/14/2004
Beta	1.94e+01	3.8e+00	4.1e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02890G	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.019e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.92 %	Analyst:	EFG
Ash/dry weight:	80.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 20:22	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.58e+01	1.2e+01	9.2e+00	PCI/GDRY	07/14/2004
Beta	1.56e+01	3.7e+00	4.3e+00	PCI/GDRY	07/14/2004

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02891H	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.015e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	89.80 %	Analyst:	EFG
Ash/dry weight:	87.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 20:22	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.55e+01	1.5e+01	8.4e+00	PCI/GDRY	07/14/2004
Beta	2.36e+01	4.4e+00	4.7e+00	PCI/GDRY	07/14/2004

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02892J	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.018e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	98.99 %	Analyst:	EFG
Ash/dry weight:	93.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 22:02	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.29e+01	1.3e+01	9.5e+00	PCI/GDRY	07/14/2004
Beta	1.60e+01	4.2e+00	4.9e+00	PCI/GDRY	07/14/2004

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02893K	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.016e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	89.63 %	Analyst:	EFG
Ash/dry weight:	86.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 22:02	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.02e+01	1.3e+01	9.2e+00	PCI/GDRY	07/14/2004
Beta	1.67e+01	3.9e+00	4.5e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02894L	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.019e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	89.95 %	Analyst:	EFG
Ash/dry weight:	89.20 %	QC type:	ANA

COUNTING INFORMATION

<i>Date and time</i>	<i>Duration (min)</i>	<i>Detector ID</i>	<i>Operator</i>
07/14/2004 22:02	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.47e+01	1.3e+01	1.0e+01	PCI/GDRY	07/14/2004
Beta	2.07e+01	4.3e+00	4.7e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02895M	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.020e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	91.98 %	Analyst:	EFG
Ash/dry weight:	85.60 %	QC type:	ANA

COUNTING INFORMATION

<i>Date and time</i>	<i>Duration (min)</i>	<i>Detector ID</i>	<i>Operator</i>
07/14/2004 22:02	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.31e+01	1.3e+01	8.2e+00	PCI/GDRY	07/14/2004
Beta	1.69e+01	3.9e+00	4.4e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

SAMPLE ANALYSIS REPORT

Sample #:	A4.02896N	QC batch #:	0003314V
Matrix:	SOIL	Prep batch #:	0008789K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.017e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.83 %	Analyst:	EFG
Ash/dry weight:	87.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2004 23:42	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.97e+01	1.3e+01	8.9e+00	PCI/GDRY	07/14/2004
Beta	1.94e+01	4.2e+00	4.7e+00	PCI/GDRY	07/14/2004

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400031**

QC BATCH SUMMARY

QC batch #: 0003314V
Preparation procedure: N/A
Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	$\pm 2\sigma$ Uncertainty (%)	Analyst
A4.02877K	DUP	N/A		EFG
A4.02878L		N/A		EFG
A4.02879M		N/A		EFG
A4.02880E		N/A		EFG
A4.02880E		N/A		EFG
A4.02881F		N/A		EFG
A4.02882G		N/A		EFG
A4.02883H		N/A		EFG
A4.02884J		N/A		EFG
A4.02885K		N/A		EFG
A4.02886L		N/A		EFG
A4.02887M		N/A		EFG
A4.02888N		N/A		EFG
A4.02889P		N/A		EFG
A4.02890G		N/A		EFG
A4.02891H		N/A		EFG
A4.02892J		N/A		EFG
A4.02893K		N/A		EFG
A4.02894L		N/A		EFG
A4.02895M		N/A		EFG
A4.02896N		N/A		EFG

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0003314V

Analytical Procedure: NAREL GR-03

LABORATORY DUPLICATES (PCI/GASH)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A4.02880E	ALPHA	2.09e+01 \pm 1.5e+01	1.38e+01 \pm 1.4e+01	40.53	-0.69 OK
A4.02880E	BETA	2.38e+01 \pm 4.8e+00	2.46e+01 \pm 4.9e+00	3.31	0.21 OK

Analyst:

Eunice F. Gatlin
Gatlin, Eunice F.

7/15/04

QA Officer:

Mark D. McEwen

7/19/04